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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/118,833	07/20/1998	TOSHIRO NISHI	0965-0232P-S	9403

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EXAMINER

CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 07/24/2003

33

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/118,833

Applicant(s)

NISHI ET AL.

Examiner

Jonathan S. Crepeau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Remarks

1. This Office action is responsive to the Appeal Brief filed on May 16, 2003. Prosecution is reopened herein as new grounds of rejection are applied to claims 4, 10-13, 21, 24, 27, and 28. However, claims 4-28 remain rejected for substantially the reasons of record over JP '913 in view of Soma et al. This action is non-final.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 4, 10-13, 21, 24, 27, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Soma et al (U.S. Patent 5,411,767). Regarding claims 4, 10, 12, and 28, Soma et al teach a solid electrolyte type fuel battery having an interconnector comprising a material having the formula ABO_3 , wherein A is preferably Ca, Ba, or Sr, and B is preferably Ti (see column 5, lines 13-38). Regarding claims 11 and 13, Soma et al. further teach a fuel electrode (1), an air electrode (3), an electrolyte (2), and a substrate (4) in Figure 1 and in column 6, line 50, et seq. Regarding claims 4, 10, 12, and 28, as disclosed in column 2, lines 47-58, the interconnector is formed by plasma spraying followed by a heat treatment, which closes pores

and microstructurally homogenizes the film. Thus, the heat-treatment step functions to “sinter” the interconnector. Regarding claims 10 and 12, the reference teaches in column 2, lines 29-37 that the interconnector film is thermally sprayed onto a fuel or air electrode “raw” material, and then the interconnector film is heat-treated. The raw (i.e., green) fuel or air electrode films would inherently be sintered along with the interconnector film, thus resulting in a “co-sintered” or “integrally burned” interconnector. Regarding claims 24 and 27, the relative density of the interconnector is 95% or greater (see col. 9, line 61). Regarding claim 21, in Table 1, Soma et al. disclose that the interconnectors are heat treated at a temperature of 1400°C.

Thus, the instant claims are anticipated.

Claim Rejections - 35 USC § 103

4. Claims 6, 8, 14-17, 22, 23, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soma et al (U.S. Pat. 5,411,767).

The reference is applied for the reasons stated in section 3 above. Regarding claims 6, 8, 14, and 16, in column 4, line 40 et seq., the reference teaches an interconnector material formula of $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$, where D can be Ca, Sr, or Ba, B can be Ti (+Mg, +Nb), x is less than or equal to 0.3, u is greater than or equal to 0, and w is less than or equal to 0.1.

The reference does not expressly teach the same or overlapping subscript ranges for the $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$ compounds as recited in claims 6, 8, 14, and 16. For example, claims 6 and 14 provide for a $Sr_{0.8}La_{0.2}TiO_3$ material, whereas the reference provides for a $Sr_{0.09}La_{0.2}TiO_3$

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material (when $w=0$, $x=0.3$, $u=0.71$, D is Sr, and B is Ti). Also, claims 8 and 16 provide for a $\text{Mg}_{0.8}\text{La}_{0.2}\text{TiO}_3$ material, whereas the reference provides for a $\text{Mg}_{0.8}\text{La}_{0.2}\text{Ti}_{0.2}\text{O}_3$ material (when $x=0$, $u=0.8$, $w=0$, and B is $\text{Ti}_{0.2}\text{Mg}_{0.8}$).

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the claimed materials and prior art materials have substantially identical elemental compositions, and therefore could reasonably be expected to have similar properties. As such, the artisan may manipulate these subscript ranges so as to vary the necessary amounts of reagents, and thus optimize the production costs of the materials. If a prior art range and a claimed range do not overlap, obviousness may still exist if the ranges are close enough that one would not expect a difference in properties. *In re Woodruff* 16 USPQ2d 1934 (Fed. Cir. 1990); *Titanium Metals Corp. v. Banner* 227 USPQ 7723 (Fed Cir. 1985); *In re Aller* 105 USPQ 2233 (CCPA 1955). See also MPEP §2144.09.

5. Claims 4-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-50913 in view of Soma et al.

Regarding claims 4, 6, 8, 10, 12, 14, 16, and 28, in the abstract, JP 8-50913 teaches a method of making a solid oxide fuel cell comprising the step of integrally sintering (burning) an air electrode (23) and an interconnector (24), which together comprise a support tube (22). Regarding claims 11, 13, 15, and 17, the fuel cell further comprises a fuel electrode (26) and an electrolyte (25). Regarding claims 5, 7, 9, and 18-20, As shown in Figures 1 and 2, the

interconnector is located at the top of the tube, thus providing for current collection from the fuel electrode through an adjacent interconnector in the “vertical” direction.

The Japanese reference does not expressly teach the material(s) which may comprise the interconnector (claims 4, 6, 8, 10, 12, 14, 16, and 28), the temperature at which the sintering is performed (claims 21-23), or the relative density of the interconnectors (claims 24-27).

As set forth above, Soma et al. teach interconnectors having relative densities of at least 95% and which comprise perovskite materials that are not patentably distinct from the instantly claimed materials. In column 3, line 23, Soma et al. describe these materials as being “suitable for [an] interconnector.” In Table 1, Soma et al. disclose that the interconnectors are heat treated at a temperature of 1400°C.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the courts have held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious (MPEP §2144.07). Accordingly, the artisan would be motivated to use the species disclosed by Soma in the interconnector of the Japanese reference. Furthermore, the artisan would be motivated to use a sintering temperature of 1400°C in the manufacturing process of JP ‘913. In column 6, lines 44-49, Soma et al. teach that a heat treatment temperature of at least 1250°C for these materials is “preferabl[e].” Therefore, the artisan would be motivated to perform the sintering step of JP ‘913 at a temperature of 1400°C.

Additionally, the recitation in instant claims 13, 15, and 17 that the electrodes, electrolyte, and interconnector are “laminated onto a substrate” is not considered to distinguish

over the Japanese reference. As noted above, the reference identifies the combination of the air electrode and interconnector as a "support tube" (22), which itself functions as a substrate. Accordingly, it is seen that the "substrate" defined by the instant claims is integrally present in the fuel cell structure of the reference. Furthermore, it is noted that Soma et al. contemplate the interchangeability of a "true" substrate (4) and an "air electrode" substrate (13) in Figures 1 and 2 and in column 7, lines 3-10. Thus, these configurations are seen as functionally equivalent.

Response to Arguments

6. Applicant's arguments filed May 16, 2003, insofar as they relate to the present rejections, have been fully considered but they are not persuasive.

Applicants first assert that the thermally sprayed material of Soma is fundamentally different from the sintered or co-sintered material of the invention. Applicant cites a definition of "sinter" as "to bring about agglomeration (in metal particles) by heating." However, as noted above, in column 2, line 47 et seq., Soma teaches a heat treatment step which results in the crystalline phases in the film becoming a homogeneous single phase so that the film is microstructurally homogenized and densified. Thus, the heat-treatment results in the agglomeration of the particles. Hence, the interconnector of Soma et al. is in fact "sintered," as provided for in the definition above.

Applicants further state that with regard to Soma, "the Examiner is inferring that two discrete steps are needed in Soma to form the material. In contrast, the present invention only

requires one step: sintering.” In response, it is agreed that Soma teaches that two discrete steps are needed to form the material: plasma spraying and sintering. However, the present invention, as claimed, is not limited only to a “sintering” step. The claims are open-ended and may include process steps other than sintering. Thus, the claims do not exclude the plasma spraying step of Soma.

Applicants further assert that Soma is non-analogous art to the present invention because “the field of endeavor of Soma is thermal spraying, which is in marked contrast to the sintering of the present invention.” However, it is submitted that Soma is concerned with interconnectors for solid oxide fuel cells, which is the same field of endeavor as the present invention.

Furthermore, Soma is also concerned with sintering, for the reasons set forth above.

Accordingly, Applicant’s argument that Soma is non-analogous art is not persuasive.

Applicants further assert that the $A_{1-x}B_xC_{1-y}D_yO_3$ formula of claims 6 and 8 has criticality when x is 0.2. Figure 30 of the application is cited as supporting this position. However, it is believed that this graph is not sufficient to establish criticality of the subscript $x=0.2$. It is noted that the relative density decreases by less than 2% for both materials when x is increased from 0.2 to 0.3. Furthermore the relative densities when $x=0.3$ are still greater than 94%. As evidenced by the inclusion of this range into the claims, 94% is considered to be a good relative density. Therefore, it is believed that Applicants have not shown criticality of the $x=0.2$ (i.e., $Sr_{0.8}La_{0.2}$) limitation. It is noted that Soma teaches an $Sr_{0.09}La_{0.2}$ composition in col. 4, line 44 (when $x=0.3$ and $u=0.71$). A comparison of the claimed composition(s) with the composition(s) of Soma may be helpful in distinguishing the claimed composition(s).

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Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051.

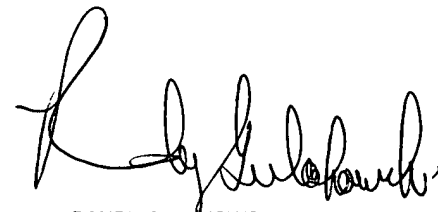
The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (703) 308-4333. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 872-9310 (for non-final communications) or (703) 872-9311 (for after-final communications).

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JSC

July 17, 2003



RANDY GULAKOWSKI
SUPERVISORY PATENT EXAMINER
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